REMARKS

Claims 1-52 are pending in the application. Claims 1, 3-7, 12-17, 19-21, 23-29, 31-34, 36-38, 40, 42, 43, 45, 46, 48, and 49 stand rejected. Claims 2, 8-11, 18, 22, 30, 35, 39, 41, 44, 47, and 50 stand objected to. Claim 52 is being amended. No new matter is being introduced.

Before responding to the specific rejections, Applicants believe that a brief discussion of the Applicants' claimed invention may be useful.

Dual-Tone Multiple-Frequency (DTMF) signals include sinusoids located between 0 Hz and about 2 kHz. Applicants identified that it is possible to reduce the sampling frequency of a once-decimated digital signal from 4 kHz to 2 kHz and still detect the DTMF sinusoids. This is recited in Claim 17 ("a splitter to separate an electrical signal . . . into subbands being at a sampling frequency of about a highest frequency of the sinusoids"). Thus, for a system detecting DTMF signals, the subband signals output by the splitter span between 0 Hz and about 2 kHz. This reduction in sampling frequency allows filters following the splitter to operate at 2 kHz instead of 4 kHz, thereby conserving bandwidth for increased DTMF detector density.

As true in any sampling frequency system, aliasing may occur as a result of sampling, decimation, or other discrete-time operation. Applicants teach use of an efficient band-split filter, having low- and high-pass filter characteristics described by the frequency responses of Fig. 6, that performs the 4 kHz to 2 kHz sample rate reduction and prevents aliasing of the 1-2 kHz DTMF signals from "appearing" as 0-1 kHz signals and the 0-1 kHz DTMF signals from "appearing" as 1-2 kHz DTMF signals.

Remarks Regarding Rejections under 35 U.S.C. § 102(b)

Claims 1, 3-7, 12-17, 19-21, 23-29, 31-34, 36-38, 40, 42, 43, 45, 46, 48, and 49 were rejected under 35 U.S.C. § 102(b) as being anticipated by Canniff *et al.*

In contrast to Applicants' Claim 17, the Canniff *et al.* reference (U.S. Pat. No. 5,619, 564) discloses a detector that includes a decimator that decimates a sampled 8 kHz analog signal to 4 kHz. The downsampled data is high-pass filtered to remove power line frequency components at 60 Hz, harmonics thereof, and a dial tone (Col. 3, lines 34-38). The sampling frequency of the signal downstream of the high-pass filter is 4 kHz. Therefore, a high tone band

elimination filter and a low tone band elimination filter that follow the high-pass filter operate at 4 kHz, which is twice the frequency of the highest frequency of the DTMF sinusoids.

The high and low tone band elimination filters remove high and low frequencies, respectively. However, the sampling frequencies downstream of the band elimination filters remains at 4 kHz, as disclosed in Col. 4, lines 3-5 ("[t]he bandpass filtered output signals from bandpass filters BPF1-BPF8 . . . are generated at a 4 kHz rate.").

Following the bandpass filters in the Canniff *et al.* detector of Fig. 1, a downsampler decimates the 4 kHz signals to 1 kHz signals. The downsampler does not separate or split the signal into subbands, nor is the output of the downsampler a frequency of about a highest frequency (*i.e.*, 2 kHz) of the dialed digits. Therefore, the Canniff *et al.* reference does not disclose the Applicants' invention as recited in Claim 17 ("a splitter to separate an electrical signal . . . into subbands being at a sampling frequency of about a highest frequency of the sinusoids").

Moreover, if the detector disclosed by Canniff *et al.* in Fig. 1 were presented with a 4 kHz sampled signal at the decimator to produce a 2 kHz sampled signal, an aliased signal would result due to a lack of low-pass filtering prior to or as part of the decimator. Thus, the Canniff *et al.* detector would not be able to detect DTMF digits reliably.

Accordingly, because the Canniff *et al.* reference does not teach every claim limitation of Applicants' Claim 17, Applicants respectfully submit the rejection under 35 U.S.C. 102(b) should be withdrawn.

Because independent Claims 1, 25, 32, 34, and 40 include similar claim limitations, the rejection should removed for these claims for similar reasons.

Dependent Claims 3-7, 12-16, 19-21, 23-24, 26-29, 31, 33, 36-38, 42, 43, 45, 46, 48, and 49 should also be allowed under 35 U.S.C. 102(b) for at least the same reasons.

Remarks Regarding Rejections under 35 U.S.C. § 103

Claims 3-5, 19-22, 27 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Canniff *et al.* in view of Applicants' admitted prior art.

Claims 3-5 are dependent from Claim 1; Claims 19-22 are dependent from Claim 17; Claim 27 depends from Claim 25; and Claim 36 depends from Claim 34. Thus, the foregoing arguments apply.

The Applicants' admitted prior art does not teach, suggest, or provide motivation for Claim 17 ("a splitter to separate an electrical signal . . . into subbands being at a sampling frequency of about a highest frequency of the sinusoids") or independent Claims 1, 25, 32, 34, and 40, which have similar claim limitations. Accordingly, in combination with the Canniff *et al.* reference, which (i) does not disclose a splitter to separate an electrical signal into subbands being at a sampling frequency of about a highest frequency of the sinusoids and (ii) discloses detection of the DTMF sinusoids at a sample rate of 1 kHz, Applicants believe that the claims recite limitations that are non-obvious in view of same.

Accordingly, Applicants respectfully submit that the rejections under 35 U.S.C. § 103(a) in view of Canniff *et al.* and admitted prior art should be withdrawn.

Claims 7, 14, 21, 24, 29, 33, and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Canniff *et al.* in view of well known prior art (MPEP 2144.03). For reasons discussed above, Applicants respectfully submit that Canniff et al. in view of well known prior art does not teach, suggest, provide motivation for every claim limitation of the independent claims as now amended ("subbands being at a sampling frequency of about a highest frequency of the sinusoids"). Accordingly, Applicants respectfully submit that this rejection under 35 U.S.C. § 103(a) should be withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is believed that all now pending claims (Claims 1-52) are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned at (978) 341-0036.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No. 44,348
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133
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